Findings & Recommendations

For The Stream Assessment & Compensation Methodologies currently proposed by VA Department of Environmental Quality (DEQ) and U.S. Army Corps of Engineers (COE)

Presented by Michael S. Rolband

P.E., P.W.S., P.W.D., LEED® AP

Wetland Studies and Solutions, Inc.

5300 Wellington Branch Drive · Suite 100 · Gainesville · Virginia 20155

www.wetlandstudies.com

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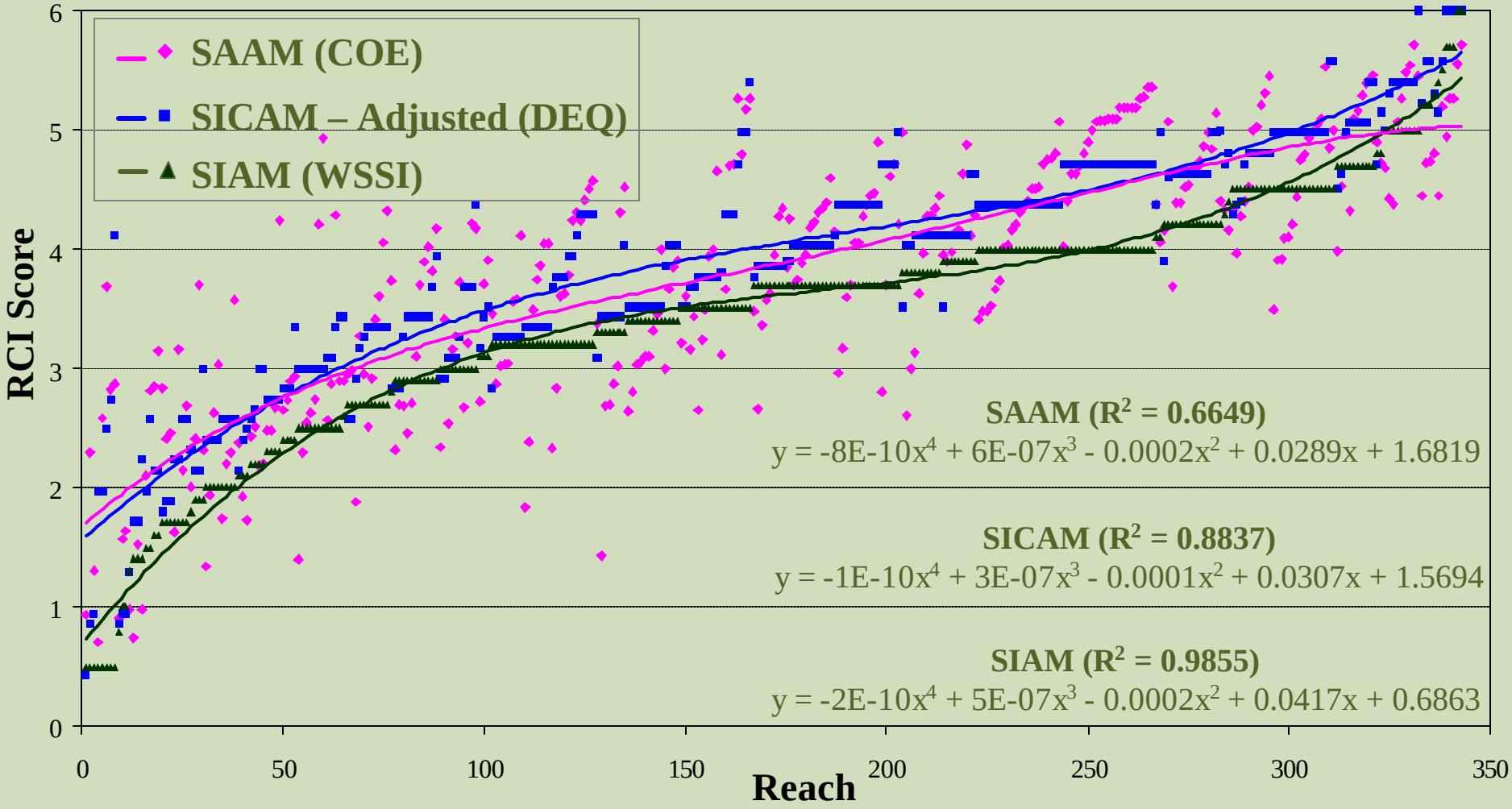
Comparison of the U.S. Army Corps of Engineers SAAM, the Virginia Department of Environmental Quality SICAM, & the Wetland Studies and Solutions, Inc. SIAM



Reaches Assessed: 343

Total Reach Length: 127,374 LF

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What is the message from this data?

- SAAM scores are more variable
  - » Due to Bank Height Ratio (BHR)
    - Impossible to accurately identify, in the field, bankfull & low bank in eroding or incising rural & urban/suburban streams.
- SICAM & SAAM value streams higher than appropriate
  - » Based upon comparison with SIAM which was calibrated using "The good, the bad, and the ugly" (*an interagency team agreed upon the relative value of these 3 streams*):

SAAM = 5.72
$SICAM_{adj}$ = 6.0
SIAM = 6.0

SAAM = 3.58
(bkf = 1.8', BHR = 2.78)
$SICAM_{adj}$ = 4.3
SIAM = 3.5

BKF disagreement: 1.0' – 2.0'
SAAM = 2.57 *(bkf = 2.0', BHR = 2.60)*
= 1.78 *(bkf = 1.0', BHR = 5.20)*
$SICAM_{adj}$ = 2.2
SIAM = 1.7

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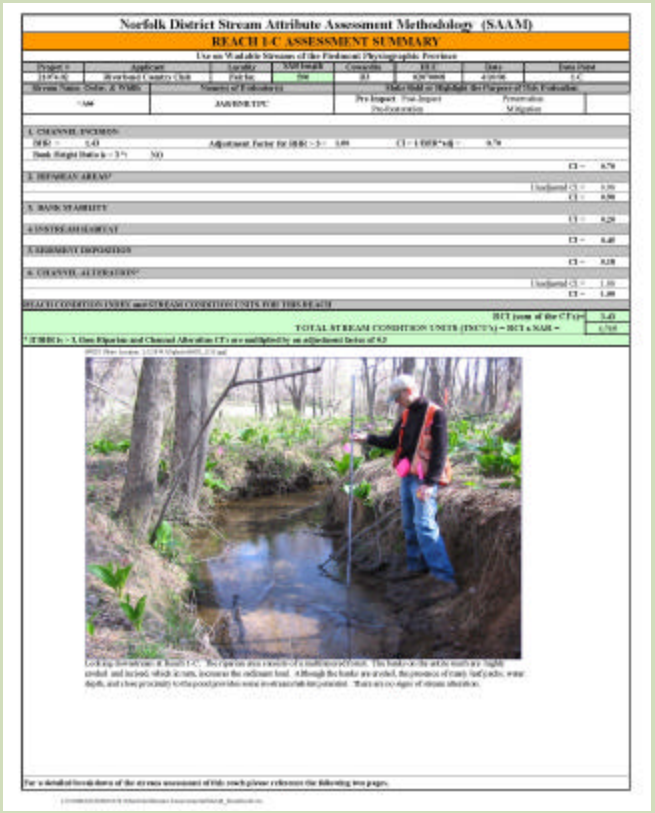
What is the message from this data?

- SAAM provides a false sense of accuracy (0.01), while SICAM starts with measurements for a moderate level of accuracy that are obscured by SQF.
- Either of the existing methodologies (SAAM or SICAM) could be used as the stream assessment methodology with a few modifications.



Norfolk District Stream Attribute Assessment Methodology (SAAM)

REACH 1-C ASSESSMENT SUMMARY

SICAM - Stream Assessment Field Form (Form 1)

Project Name:	Riverbend Country Club	JPA Number:	N/A
Stream ID:	Stream 1	Date:	4/10/2006
Reach ID:	1-C	HUC:	2070008
Reach Length (feet):		Locality:	Fairfax County
Stream Type:	R5	File Number:	21034 02
Evaluators:	JAB/BNK/TPC		

A. Man-Made Channels (Use the assigned SQF)

- [ ] Culvert (except bottomless) ----→ 0.00
- [ ] Open Channel - concrete ----→ 0.25
- [ ] Open Channel - gabions/blocks ----→ 0.50
- [ ] Open Channel - riprap ----→
- [ ] No hardened bottom ----→
- [ ] Naturalized ----→
- [x] Not Applicable ----→

Apply Natural Channel Assessment Methodology

B. Natural Channel Methodology

Evaluate the following parameters using the definitions provided in Sections 3.2.1 - 3.2.4.

1. Channel Condition
2. Riparian Buffer
3. Instream Habitat
4. Channel Alteration

C. Calculations

After evaluating the parameters, use the ECI Flow Charts to determine the RCI. Then use Table 1 to determine the Stream Quality & SQF.

Reach Condition Index (RCI) (0 - 7) = 4.3

Stream Quality = Suboptimal

Stream Quality Factor (SQF) = 0.5

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D. Attach a representative photo of the assessment reach and provide a short narrative describing the reach conditions.

Looking downstream at Reach 1-C. The riparian area consists of a multilayered forest. The banks on the entire reach are highly eroded and incised, which in turn, increases the sediment load. Although the banks are eroded, the presence of many leaf pa

Summary of Proposed Impacts:

Proposed Impact:

Impact Factor: PROVIDED UNDER SEPARATE COVER

JPA Impact Area Designation:

Summary of Proposed Restoration Practices:

Proposed Restoration Practices:

Credit Ratio: PROVIDED UNDER SEPARATE COVER

Adjustment Factor(s):

Adjusted Credit Ratio:

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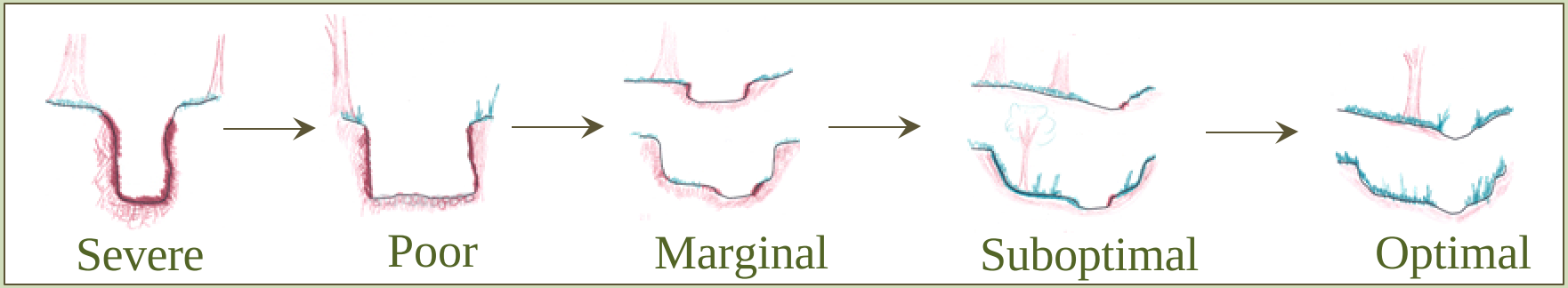
COE Assessment

<u>Finding #1</u>: BHR is hard to accurately determine in the field, even by trained professionals.

- » Impossible to accurately identify, in the field, bankfull & low bank in eroding or incising rural & urban/suburban streams.
  - Dave Rosgen informed COE staff of this issue on Feb. 22, 2006. COE indicated agreement – but that policy overruled technical basis of evaluation.
- » Measurement is not easily repeatable in eroding or incising rural & urban/suburban streams.
  - Misinterpretation of bankfull & low bank features.
  - BHR may vary depending on where measurements are taken.
  - Appropriate Regional Curves (for small size D.A.'s typically encountered) are not available to confirm observed field indicators.

<u>Solution #1</u>: Remove BHR calculation from the channel condition indice, & replace with an evaluation of the channel's status along the evolutionary process.



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COE Assessment

<u>Finding #2:</u> When BHR = 3.0, an adjustment factor is applied to riparian & channel alteration indices (value is not based upon the literature).

1) Streams highly unstable at BHR = 1.63
2) Reduction in Riparian Score should occur at lower BHR's & not be a step-function relationship.
3) Assumes a direct correlation between channel alteration & channel incision. (*Not always true*)

<u>Solution #2:</u> Revise Scoring weights

1) Remove adjustment factor.
2) Value indices, within overall RCI score, on their contribution to overall stream condition.

Examples of Bank Height Ratios (BHR) for Stability Evaluation

Stability Rating	BHR
Stable	1.0 -1.09
Mod. Unstable	1.1 – 1.44
Unstable	1.45 – 1.62
Highly Unstable	= 1.63

* From Watershed Assessment of River Stability & Sediment Supply (WARSSS) Version 1.0 (Rosgen & EPA)

Examples Using Existing Parameters

Parameter	Score
1. Channel Condition	(2.0)
2. Riparian Buffer	(1.0)
3. Bank Stability	(1.0)
4. Sediment Dep	(0.5)
5. Channel Alteration	(0.5)
(Total RCI Score):	**6.0**

COE Assessment

<u>Finding #3:</u> Manual needs refinement.

<u>Solution #3:</u> Minor Improvements:

- » Revise manual to account for ephemeral & low gradient streams.
- » Include all calculations on Forms.
- » Address special cases (*i.e. pond located in riparian area*).
- » Add example photos with captions (*provide examples of condition indicies & possible scores*).
- » Provide a reach summary page & a place for reach photo. Also allow a space for reach name on each form (*all pages*).
- » Clarify riparian definitions.
  - Difference between PSS, non-maintained herbaceous, utility easement & maintained lawns.
- » Clarify how rip-rap channels should be scored.
- » Only assess direct anthropogenic alterations to a reach (*i.e. remove stormwater input reference*).
- » Clarify how to score spot stablization within a reach.

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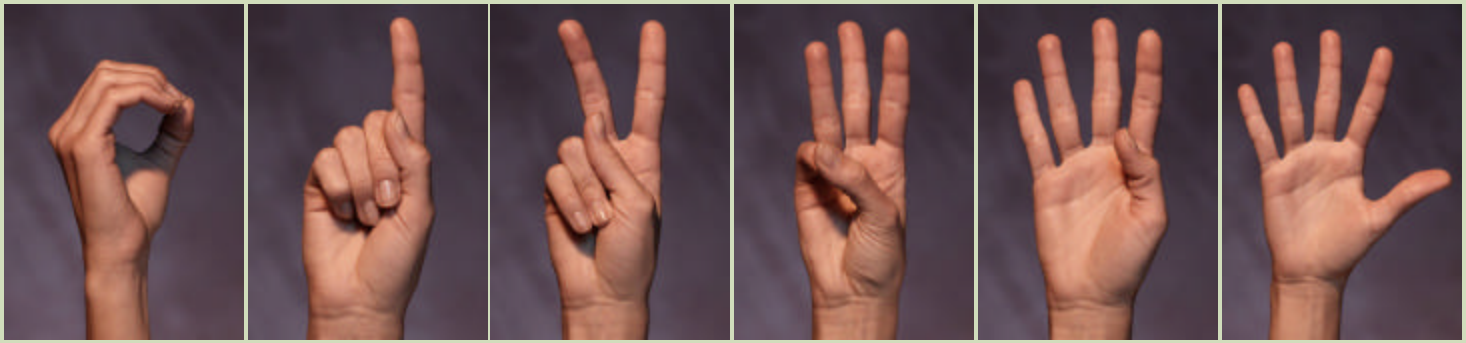
DEQ Assessment

<u>Finding #1:</u> The Stream Quality Factor (SQF) reduces the precision in the reach value initially provided by the RCI scores.

<u>Solution #1:</u> Remove SQF from assessment methodology & directly apply the RCI score to impact and compensation calculations.

OR

Use a single assessment practice & simply rank streams into 5 or 6 categories, and save lots of energy.



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DEQ Assessment

<u>Finding #2:</u> Manual needs refinement.

<u>Solution #2:</u> Minor Improvements:

- » Assess bottomless culverts as a channel alteration only.
- » Remove inner/outer riparian buffer assessment.
- » Add description of how to score riparian area with small impervious areas & pedestrian trails.
- » Add captions to all photos, they should describe what photo is depicting.
- » Provide example scoring for naturalized man-made channels (*i.e. channel condition & instream habitat scores for riprap channels*).
- » Remove reference to floodplain and bankfull age on Optimal & Suboptimal channel condition.
- » Revise marginal channel condition to include channels that have alternating bank stability (*i.e. left bank = erosive and high, right bank = stable with floodplain access*).

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COE Impact & Compensation

<u>Finding #1:</u> This compensation method is an iterative process that requires a site specific compensation plan be tailored to each impact reach before compensation requirements can be determined.

» Makes calculating mitigation requirements very difficult for a site with multiple impact reaches & multiple compensation reaches.

<u>Solution #1:</u>

» Separate Impact & Compensation calculations.

- Computing stream compensation requirements independently enables both the applicants & agencies to know the total required compensation early in the development process.

» Express Impact & Compensation values <u>in terms of SCUs</u> – this should be the currency of stream impacts & mitigation. This will simplify the debiting & crediting procedure (*makes understanding, calculating, & reviewing much easier*).

COE Impact & Compensation

<u>Finding #2:</u> The compensation method does not take into account location (urban/rural), impact type, or stream size.

- **Impact Type**. Values all impacts the same - removes incentive to use less intrusive design/construction techniques.
- **Location**. Removes the incentive to restore urban streams (*cheaper to restore rural*) - causes net loss in sustainable urban natural resources.
- **Stream Size**. Lacks a method to correlate size of impact reach to compensation reach. This focuses restoration on smaller, easier (*& cheaper*) to restore headwaters & ignores larger streams.

<u>Solution #2:</u>

- Assign values to different impact types.
- Develop a <u>predefined</u> suite of restoration practices that are valued on required effort (*i.e. buffer enhancement vs. natural channel design*) & location (*urban/suburban vs. rural*) – incentive for implementing all types of restoration.
- Provide specifications & guidance for appropriate usage & value (SCUs/foot). Each practice should be assigned a defined level of mitigation lift *(eliminates opportunity for user error).*
- Develop a relationship between compensation & impact reaches based on stream size.

DEQ Impact & Compensation

<u>Finding #1:</u> Expressing compensation requirements in terms of linear feet is misleading, and unnecessarily complicated.

- When the impact reach is first defined by RCI another "value" is created, weighted linear feet (LF_w) – not linear feet.
  - Length of Impact * SQF * Impact Factor = Compensation Required (LF_w)
  - Yet, it's <u>not</u> what you actually need to provide as Compensation – as that varies based on your credit assigned to the compensation plan (*this may vary by 20 fold*).

<u>Solution #1:</u> Express Impact & Compensation values in terms of a common currency, Stream Condition Units (SCUs).

- This will simplify the debiting and crediting procedure because it will not confuse actual length of impact with the amount of compensation required and provided (*makes understanding, calculating, & reviewing easier*).

DEQ Impact & Compensation

Finding #2:

Current Credit Determination Worksheet adds unnecessary complexity;
And,

This compensation method fails to adequately consider restoration type/location & does not take into account stream size.

- **Restoration Type.** User must calculate a project specific ratio and adjustment factor (*creates an opportunity for user error*).
- **Location.** This method applies a factor that attempts to account for the increase in cost for urban restoration; however, the variance is not enough to prevent continued export of stream resources to rural areas.
- **Stream Size**. Lacks a method to correlate size of impact reach to compensation reach. This focuses restoration on smaller, easier (*& cheaper*) to restore headwaters & ignores larger streams.

Solution #2:

- Provide a predefined suite of restoration practices that are valued on required effort (*i.e. buffer enhancement vs. natural channel design*) & location (*urban/suburban vs. rural*) – in lieu of credit ratios.
- Provide specifications & guidance for appropriate usage & value (SCUs/foot). This simplifies compensation calculation – don't have to calculate compensation ratio.
- Develop a relationship between compensation & impact reaches based on stream size.

Suggested Features for an effective Stream Manual

1. **Assessment:**
   - » Easy to apply in a repeatable manner
   - » Technically defensible
2. **Impact & Compensation:**
   - » Use one common currency (SCUs).
   - » Quantify impact based on severity (assign an "impact factor") to encourage "minimization" of impacts.
   - » Consider location (urban/suburban & rural), stream size, and restoration technique.
   - » Provide specific examples & definitions of restoration techniques & their resulting lift (in SCU's) to minimize interpretation conflict.

Either of the existing methodologies (SAAM or SICAM) could achieve these goals with a few modifications.

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